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Saturday, July 22, 2006

Security and the origins of agriculture

Climate-based explanations for the birth of agriculture are nonsense (like this one, via Marginal Revolution, which adds further nonsense about agriculture having originated around rivers). Their popularity stems from little more than the climate being an easily measured variable. There was plenty of good land quite suitable for agriculture in temperate climates (and, more importantly, in thousands of temperate microclimates) during the last Ice Age. There were many areas even during the coldest part of the Ice Age that satisfied the climate, soil, ecology, and other environmental requirements of early agriculture. They were just closer to the equator.

More likely explanations for the agricultural revolution are probably far less observable:

> The crucial role of security for the history of farming may also shed light on the birth of agricultural in the first place. Hunter-gatherers were very knowledgeable about plants and animals, far more than the typical modern. It would not have taken a genius -- and there were many, as their brains were as large as ours -- to figure out that you can plant a seed into the ground and it will grow. There must have been, rather, some severe institutional constraints that prevented agriculture from arising in the first place. The basic problem is that somebody has to protect that seedling for several months from enemies, and then has to harvest it before the enemy (or simply a envious neighbor) does. Security and allocation of property rights between providers of security and providers of farm labor were the intractable problems that took vast amounts of trial and error as well as genius to solve in order for agriculture to take root.

This would also explain how agriculture could spread from a single innovation yet look like independent inventions in the archaeological record. There were at least eight centers of secondary innovations (e.g. crop and livestock domestications and agricultural tools) that look independent: the Middle East, China, India, sub-Saharan Africa, Peru, central America, eastern North America, and New Guinea. But they all occured within a few thousand years of each other, after at least 100,000 years of anatomically modern humans. During these millenia humans were without agriculture despite large numbers of microclimates and microecologies suitable for agriculture during that entire period.

This indicates the slow spread (with many failed attempts and, quite likely, many reversals) of a primary innovation necessary for the use of these secondary innovations. The primary innovation had to be primarily cultural rather than genetic because it came long after the out-migration from Africa c. 80K-40K BP and was taken up by many of the genetically diverse results of that out-migration. Given what we know about the importance of cooperation, institutions, and security to the productivity of human economies, that innovation

About Me

Nick Szabo

"A premier thinker about history, law and economics, and the lessons they have for security." -- Adam Shostack, Emergent Chaos

"Szabo comes out with these essays that leave me in awe." -- Brian Dunbar

"Reading material that is eclectic, challenging and endlessly fascinating." -- Sean McGrath, Propylon

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which slowly spread and made agriculture possible was almost surely an innovation in the culture of cooperation. Alas, the spread of such an innovation in oral culture can be observed at best indirectly in the archaeological record.

This would put the origins of agricultural into the more general large patterns of history, the most important of which are based on the interaction between security and wealth.

Posted by Nick Szabo at 12:33 PM

6 comments:

Mike Linksvayer said...

I buy the importance of security, but cultural transmission worldwide of the innovations enabling security and thus enabling agriculture seems like a stretch, particularly in the case of the Americas, which could hardly have been more culturally isolated from the Eurasia after agriculture.

Your argument against the independent invention of security-enabling innovations seems to be that humans existed for 100k years but only practiced agriculture for the last 10k, and throughout the world in the latter period.

Those innovations could be very fragile but not so difficult that they were made only once. As human population increased after probable pleistocene bottlenecks more trials were run, and the independently invented innovations only stuck between 10k and 2k years ago depending on location in a probabalistic fashion.

(I am just making this up out of incredulity at worldwide cultural transmission. Given the improbability of archeological evidence for cultural transmission I'd love to see a better argument for the improbability of independent invention.)

7:54 PM

Mike Huben said...

Long-term stability of ape and monkey troupe territories (many years at a time) would suggest to me that adequate security for agriculture could be much older than Homo. Maybe you should read some Goodall and Fosse.

I'd suspect that archaeolocal evidence would show permanent (likely secure) habitation at those sites where agriculture was developed long before agriculture emerged.

7:40 PM

Nick Szabo said...

Response in reverse order:

(1) That some other apes who eat mainly fruit can (mostly) defend their wild fruit trees is not very good evidence that humans with weapons could defend a substantial capital investment in cultivation against other humans with weapons and fire. At least not without an improbable and risky advance in social cooperation that I have suggested. Better evidence is the substantial amounts that most later agricultural societies are known to have spent on defense, including defense against hunters and nomads, to the point where military leaders dominated most of these societies.

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(2) I don't share your intuition about ancient cultural transmission. Admittedly not much is known about ancient travel patterns and cultural transmission of technology, and even less about transmission of norms of social cooperation (e.g. legal innovations). So both you and I or anybody who talks about this subject is wildly speculating.

There are plenty of scholars who have recognized influences from the Middle East (ziggarats and pyramids, and other architectural and artistic styles), and perhaps even China and Africa, in central and southern American civilization. Given that many Polynesians over the course of a few hundred years were blown off course into previously unknown tiny places like Hawaii and Easter Island, I find it highly improbable that many of them did not also make it to the much more probable landfall of America. (That, like the Norse in Newfoundland, they didn't survive long is also highly probable). More relevantly, since the Polynesians were probably too late for the invention of agriculture in America c. 3000 BC, America is such a big target for boats blown off course that Atlantic boats surely made at least hundreds of landfalls in the years between 10,000 and 3,000 BC. Because these trips were almost always one-way, and because it was an age of oral culture, these discoveries would have soon been forgotten. (I don't think it's at all coincidental that "Columbus discovered America" less than a half century after the Europeans started massively using the printing press. Columbus discovered America _for the world_ because the printing press was available to spread his news among a rapidly literizing population).

Another possibility: the first signs of agriculture in the Middle East date back to at least 11,000 BC, which gives over a thousand years for those innovators' cultural ideas (whether in the form of stories or a as technology such as a weapon that influenced security and institution forms, making possible but not usually immediately giving rise to agriculture) to influence Bering land bridge immigrants even if they didn't immediately develop agriculture as a result.

Estimates of human population prior to agriculture, too, are rather speculative. That we are descended from only about 10,000 individuals in 70K BC does not necessarily imply a population bottleneck at that time. After the spread out of Africa 70K-40K BC I suspect population soon grew to be almost as large as it was in 11K BC. Also, the 100K I suggested is somewhat arbitrarily conservative as some date anatomically modern humans to 200K, and it's even not clear to me why even homo erectus could not have invented some primtive form of agriculture, other than the prohibitive security costs of protecting the growing plants.

5:29 PM

Owen said...

Have you any comments on the Guns Germs and Steel theory of the origins of civilisation?

4:00 AM

Anonymous said...

Still unclear why it would take 100k years for this to suddenly emerge. Planting seeds is not that complicated, but neither is security, at small scale. Anti-animal fences are not rocket science. Human pop density extremely low at first, so theft was not a huge issue. The tribe of 20 or 40 cooperates, and there are no other tribes around to rob them.

Instead, the timing -- millennia of nothing, then a sudden explosion -- fits a standard theme of technological development: punctuated equilibrium. Something set it off. Not saying it was climate. It might be as simple as that humans were so few, at first, that it took 100k years for them to eat all easy prey in Eurasia. Then protein supply fell to a point that necessity became the mother of invention.

1:01 PM

Bruce Swanson said...

I did a search for "cities" and "city" in this post and found none. This did not surprise me, as the role of prehistoric cities in the invention of agriculture remains entirely unknown to many otherwise well-informed and well read people. The late urbanologist Jane Jacobs may not have been the first to think of it but she was certainly its best advocate, which she presented in her 1969 book "The

Economy of Cities". In my view she makes a very compelling case that prehistoric cities -- not mere villages or settlements or even hunter gatherers -- invented agriculture. (The first chapter of that book is entitled "Cities First - Rural Development Later.")

If one is open-minded enough to assimilate her idea -- and many academics have not been -- it is impossible to accept any other theory as to the origins of agriculture. Basically it started in cities like Catal Huyuk and spread to outlying areas exactly like modern cities relocate their manufacturing to outlying areas for reasons of cost and space. I recommend her book highly (and all her other books too).

5:12 PM

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